PATENT APPLICATION
Q67901

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of

NAKAMURA, Masaaki, et al.

Appln. No.: Not Yet Assigned

Confirmation No.: Not Yet Assigned | Group Art Unit: Not Yet Assigned

Filed: December 28, 2001 | Examiner: Not Yet Assigned

For: RUBBER-REINFORCING FIBER, PRODUCTION THEREOF, AND RUBBER ARTICLE AND PNEUMATIC TIRE REINFORCED BY RUBBER-REINFORCING FIBER

PRELIMINARY AMENDMENT

Commissioner for Patents
Washington, D.C. 20231

Sir:

Prior to examination, please amend the above-identified application as follows:

IN THE CLAIMS:

Please enter the following amended claims:

1. (Amended) A rubber-reinforcing fiber comprising an organic fiber or an inorganic fiber made of an non-metallic inorganic compound, the organic fiber or the inorganic fiber being provided with a coating layer of 10 Å to 40 μm thick, and the coating layer containing an alloy of cobalt and at least one alloying element such as zinc, copper, chromium, titanium, nickel, silver, tungsten, tantalum, and molybdenum.

5. (Amended) The rubber-reinforcing fiber according to claim 1, wherein the organic fiber or the inorganic fiber is substantially non-bundled.

6. (Amended) The rubber-reinforcing fiber according to claim 1, wherein the organic or inorganic fiber substantially non-bundled is a fiber aggregate comprising a single filament, a multifilament of ten pieces or less of filaments, or a parallel filament often pieces or less of adjoining filaments.

8. (Amended) The rubber-reinforcing fiber according to claim 6, wherein the fiber aggregate has a permeability to dry plating particles, which allows the plating particles passing through the fiber aggregate to form a plating layer having a maximum thickness of 10 Å or more on a film disposed on the back surface of the fiber aggregate with a distance of 1 mm or less, when measured by carrying out a dry plating treatment under conditions such that a plating layer having a maximum thickness of 40 μm or less is formed on a film disposed on the front surface of the fiber aggregate.

9. (Amended) The rubber-reinforcing fiber according to claim 6, wherein the fiber aggregate has a permeability to dry plating particles, which allows the plating particles passing through the fiber aggregate to form a plating layer having a minimum thickness of 10 A or more on a film disposed on the back surface of the fiber aggregate with a distance of 1 mm or less, when measured by carrying out a dry plating treatment under conditions such that a plating layer having a maximum thickness of 40 μm or less is formed on a film disposed on the front surface of the fiber aggregate.

10. (Amended) The rubber-reinforcing fiber according to claim 1, wherein the organic fiber is a polyester fiber, a polyamide fiber, a poly(vinyl alcohol) fiber, an acrylic

fiber, a polyolefin fiber, a polyimide fiber, a poly(phenylene sulfide) fiber, a poly(ether ether ketone) fiber, a polybenzazole fiber, a viscose fiber, or a solvent-spun cellulose fiber; and the inorganic fiber made of a non-metallic inorganic compound is a carbon fiber, a ceramic fiber or a glass fiber.

11. (Amended) The rubber-reinforcing fiber according to claim 1, wherein the organic fiber compnses a polyester monofilament cord made of poly(ethylene terephthalate) or mainly made of poly(ethylene terephthalate), and satisfies all the following requirements:

(a) intrinsic viscosity: 0.85 dl/g or higher;

(b) birefringence: 0.17 or higher;

(c) crystal orientation: 0.88 or higher;

(d) density: 1.32 g/cm^3 or higher;

(e) fineness: 1000 to 9000 dtex;

(f) tenacity: 5.2 gf/dtex or higher; and

(g) initial modulus: 50 gf/dtex or higher.

12. (Amended) The rubber-reinforcing fiber according to claim 1, wherein the organic fiber is a polyester short fiber, a polyamide short fiber, a poly(vinyl alcohol) short fiber, an acrylic short fiber, a polyolefin short fiber, a polyimide short fiber, a poly(phenylene suffide) short fiber, a poly(ether ether ketone) short fiber, a polybenzazole short fiber, a viscose short fiber, or a 5 solvent-spun cellulose short fiber.

13. (Amended) A method for producing a rubber-reinforcing fiber, comprising a step of dry-plating a coating layer of a thickness of 10 Å to 40 μm on an organic or inorganic fiber which is substantially non-twisted, the coating layer containing an alloy of cobalt and at least one alloying element such as zinc, copper, chromium, titanium, nickel, silver, tungsten, tantalum, and molybdenum.

15. (Amended) The method according to claim 13, wherein the organic or inorganic fiber is further subjected to a processing for twisting or cutting into short fiber after dry-plating the coating layer.

16. (Amended) The method according to claim 13, wherein the coating layer is continuously formed by subjecting the organic or inorganic fiber comprising a single filament or ten pieces or less of filaments to the dry-plating treatment or to the dry-plating treatment successively after the plasma treatment while allowing the fiber to continuously run by pulling the fiber in its length direction.

17. (Amended) The method according to claim 13, wherein the coating layer is formed by subjecting a plurality of the organic or inorganic fibers arranged at intervals to the dry-plating treatment or to the dry-plating treatment successively after the plasma treatment while allowing the fibers to continuously run by pulling the fibers in their length direction, each fiber comprising a single filament or ten pieces or less of filaments, thereby forming the coating layer on a plurality of the fibers simultaneously and continuously.

18. (Amended) The method according to claim 13, wherein a fiber aggregate comprising entangled plurality of filaments each substantially not twisted with an adjoining filament is subjected to the dry-plating or to the dry-plating treatment successively after the plasma treatment to form the coating layer having a thickness of 10 Å to 40 μm; and then the dry-plated fiber aggregate is processed into short fibers.

19. (Amended) The method according to claim 13, wherein a single short fiber filament or a plurality of short fiber filaments are subjected to the dry-plating treatment or subjected to the dry-plating treatment successively after the plasma treatment while keeping the short fiber filament or filaments moving on a stationary or running support, thereby forming the coating layer on the short fiber filament or filaments.

20. (Amended) The method according to claim 13, wherein the dry plating is a physical vapor deposition by vacuum deposition or ion plating.

21. (Amended) The method according to claim 13, wherein the dry plating is a physical vapor deposition by sputtering.

22. (Amended) A rubber-fiber composite comprising the rubber-reinforcing fiber as defined in claim 1 and a rubber composition.

REMARKS

The claims have been amended to delete the multiple dependency, and to incorporate "an alloy of cobalt and at least one alloying element such as zinc, copper, chromium, titanium, nickel, silver, tungsten, tantalum, and molybdenum" into Claims 1 and 13 as a component for constituting the coating layer. Support for the amendment to Claims 1 and 13 is provided by, for example, page 11 of the specification, lines 13-15.

Entry and consideration of this Amendment is respectfully requested.

Respectfully submitted,

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Date: December 28, 2001

APPENDIX

VERSION WITH MARKINGS TO SHOW CHANGES MADE

IN THE CLAIMS:

The claims are amended as follows:

1. (Amended) A rubber-reinforcing fiber comprising an organic fiber or an inorganic fiber made of an non-metallic inorganic compound, the organic fiber or the inorganic fiber being provided with a coating layer of 10 Å to 40 μm thick, and the coating layer containing [at least one metal and/or metal compound selected from the group consisting of cobalt, zinc, copper, titanium, silver, nickel and compounds of the preceding metals] an alloy of cobalt and at least one alloying element such as zinc, copper, chromium, titanium, nickel, silver, tungsten, tantalum, and molybdenum.

5. (Amended) The rubber-reinforcing fiber according to [any one of claims 1 to 4] claim 1, wherein the organic fiber or the inorganic fiber is substantially non-bundled.

6. (Amended) The rubber-reinforcing fiber according to [any one of claims 1 to 4] claim 1, wherein the organic or inorganic fiber substantially non-bundled is a fiber aggregate comprising a single filament, a multifilament of ten pieces or less of filaments, or a parallel filament often pieces or less of adjoining filaments.

8. (Amended) The rubber-reinforcing fiber according to claim 6 [or 7], wherein the fiber aggregate has a permeability to dry plating particles, which allows the plating particles passing through the fiber aggregate to form a plating layer having a maximum

thickness of 10 Å or more on a film disposed on the back surface of the fiber aggregate with a distance of 1 mm or less, when measured by carrying out a dry plating treatment under conditions such that a plating layer having a maximum thickness of 40 μm or less is formed on a film disposed on the front surface of the fiber aggregate.

9. (Amended) The rubber-reinforcing fiber according to claim 6 [or 7], wherein the fiber aggregate has a permeability to dry plating particles, which allows the plating particles passing through the fiber aggregate to form a plating layer having a minimum thickness of 10 A or more on a film disposed on the back surface of the fiber aggregate with a distance of 1 mm or less, when measured by carrying out a dry plating treatment under conditions such that a plating layer having a maximum thickness of 40 μm or less is formed on a film disposed on the front surface of the fiber aggregate.

10. (Amended) The rubber-reinforcing fiber according to [any one of claims 1 to 9] claim 1, wherein the organic fiber is a polyester fiber, a polyamide fiber, a poly(vinyl alcohol) fiber, an acrylic fiber, a polyolefin fiber, a polyimide fiber, a poly(phenylene sulfide) fiber, a poly(ether ether ketone) fiber, a polybenzazole fiber, a viscose fiber, or a solvent-spun cellulose fiber; and the inorganic fiber made of a non-metallic inorganic compound is a carbon fiber, a ceramic fiber or a glass fiber.

11. (Amended) The rubber-reinforcing fiber according to [any one of claims 1 to 10] claim 1, wherein the organic fiber comprises a polyester monofilament cord made of poly(ethylene terephthalate) or mainly made of poly(ethylene terephthalate), and satisfies all the following requirements:

(a) intrinsic viscosity: 0.85 dl/g or higher;

(b) birefringence: 0.17 or higher;

(c) crystal orientation: 0.88 or higher;

(d) density: 1.32 g/cm^3 or higher;

(e) fineness: 1000 to 9000 dtex;

(f) tenacity: 5.2 gf/dtex or higher; and

(g) initial modulus: 50 gf/dtex or higher.

12. (Amended) The rubber-reinforcing fiber according to [any one of claims 1 to 11] claim 1, wherein the organic fiber is a polyester short fiber, a polyamide short fiber, a poly(vinyl alcohol) short fiber, an acrylic short fiber, a polyolefin short fiber, a polyimide short fiber, a poly(phenylene suffide) short fiber, a poly(ether ether ketone) short fiber, a polybenzazole short fiber, a viscose short fiber, or a 5 solvent-spun cellulose short fiber.

13. (Amended) A method for producing a rubber-reinforcing fiber, comprising a step of dry-plating a coating layer of a thickness of 10 Å to 40 μm on an organic or inorganic fiber which is substantially non-twisted, the coating layer containing [at least one metal and/or metal compound selected from the group consisting of 10 cobalt, zinc, copper, titanium, silver, nickel and compounds of the preceding metals] an alloy of cobalt and at least one alloying element such as zinc, copper, chromium, titanium, nickel, silver, tungsten, tantalum, and molybdenum.

15. (Amended) The method according to claim 13 [or 14], wherein the organic

or inorganic fiber is further subjected to a processing for twisting or cutting into short fiber after dry-plating the coating layer.

16. (Amended) The method according to [any one of claims 13 to 15] claim 13, wherein the coating layer is continuously formed by subjecting the organic or inorganic fiber comprising a single filament or ten pieces or less of filaments to the dry-plating treatment or to the dry-plating treatment successively after the plasma treatment while allowing the fiber to continuously run by pulling the fiber in its length direction.

17. (Amended) The method according to [any one of claims 13 to 16] claim 13, wherein the coating layer is formed by subjecting a plurality of the organic or inorganic fibers arranged at intervals to the dry-plating treatment or to the dry-plating treatment successively after the plasma treatment while allowing the fibers to continuously run by pulling the fibers in their length direction, each fiber comprising a single filament or ten pieces or less of filaments, thereby forming the coating layer on a plurality of the fibers simultaneously and continuously.

18. (Amended) The method according to [any one of claims 13 to 15] claim 13, wherein a fiber aggregate comprising entangled plurality of filaments each substantially not twisted with an adjoining filament is subjected to the dry-plating or to the dry-plating treatment successively after the plasma treatment to form the coating layer having a thickness of 10 Å to 40 μm; and then the dry-plated fiber aggregate is processed into short fibers.

19. (Amended) The method according to claim 13 [or 14], wherein a single short fiber filament or a plurality of short fiber filaments are subjected to the dry-plating treatment or subjected to the dry-plating treatment successively after the plasma treatment while keeping the short fiber filament or filaments moving on a stationary or running support, thereby forming the coating layer on the short fiber filament or filaments.

20. (Amended) The method according to [any one of claims 13 to 19] claim 13, wherein the dry plating is a physical vapor deposition by vacuum deposition or ion plating.

21. (Amended) The method according to [any one of claims 13 to 19] claim 13, wherein the dry plating is a physical vapor deposition by sputtering.

22. (Amended) A rubber-fiber composite comprising the rubber-reinforcing fiber as defined in [any one of claims 1 to 12] claim 1 and a rubber composition.

PATENT APPLICATION

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of

NAKAMURA, MASAAKI, et al.

Appln. No.: 10/019,250

Confirmation No.: 1287 Group Art Unit: Not yet Assigned

Filed: December 28, 2001 Examiner: Not Yet Assigned

For: RUBBER-REINFORCING FIBER, PRODUCTION THEREOF, AND RUBBER ARTICLE AND PNEUMATIC TIRE REINFORCED BY RUBBER-REINFORCING FIBER

SUPPLEMENTAL PRELIMINARY AMENDMENT

Commissioner for Patents
Washington, D.C. 20231

Sir:

Prior to examination, please amend the above-identified application as follows:

IN THE CLAIMS:

Please enter the following amended claims:

1. (Twice Amended) A rubber-reinforcing fiber comprising an organic fiber or an inorganic fiber made of an non-metallic inorganic compound, the organic fiber or the inorganic fiber being provided with a coating layer of 10 Å to 40 μm thick, and the coating layer containing at least one metal and/or metal compound selected from the group consisting of cobalt, zinc, copper, titanium, silver, nickel and compounds of the preceding metals, or an alloy of cobalt and at least one alloying element such as zinc, copper, chromium, titanium, nickel silver, tungsten, tantalum and molybdenum.

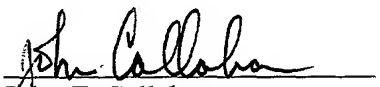
13. (Twice Amended) A method for producing a rubber-reinforcing fiber, comprising a step of dry-plating a coating layer of a thickness of 10 Å to 40 μm on an organic or inorganic fiber which is substantially non-twisted, the coating layer containing at least one metal and/or metal compound selected from the group consisting of cobalt, zinc, copper, titanium, silver, nickel and compounds of the preceding metals, or an alloy of cobalt and at least one alloying element such as zinc, copper, chromium, titanium, nickel, silver, tungsten, tantalum and molybdenum.

REMARKS

Claims 1 and 13 have been amended to reintroduce the original language regarding the coating layer composition. No new matter has been added. Support for the present amendment is provided by original Claims 1 and 13.

Examination of the Application on the merits is requested.

Respectfully submitted,



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APPENDIX

VERSION WITH MARKINGS TO SHOW CHANGES MADE

IN THE CLAIMS:

The claims are amended as follows:

1. (Twice Amended) A rubber-reinforcing fiber comprising an organic fiber or an inorganic fiber made of an non-metallic inorganic compound, the organic fiber or the inorganic fiber being provided with a coating layer of 10 Å to 40 μm thick, and the coating layer containing at least one metal and/or metal compound selected from the group consisting of cobalt, zinc, copper, titanium, silver, nickel and compounds of the preceding metals, or an alloy of cobalt and at least one alloying element such as zinc, copper, chromium, titanium, nickel silver, tungsten, tantalum and molybdenum.

13. (Twice Amended) A method for producing a rubber-reinforcing fiber, comprising a step of dry-plating a coating layer of a thickness of 10Å to 40 μm on an organic or inorganic fiber which is substantially non-twisted, the coating layer containing at least one metal and/or metal compound selected from the group consisting of cobalt, zinc, copper, titanium, silver, nickel and compounds of the preceding metals, or an alloy of cobalt and at least one alloying element such as zinc, copper, chromium, titanium, nickel, silver, tungsten, tantalum and molybdenum.